

CHAPTER 74. EVALUATE PART 121/135 (10 OR MORE AND TURBINE POWERED AIRCRAFT) OPERATOR'S WEIGHT AND BALANCE CONTROL PROGRAM

SECTION 1. BACKGROUND

1. PROGRAM TRACKING AND REPORTING SUBSYSTEM (PTRS) ACTIVITY CODES.

A. Maintenance: 3328/3329

B. Avionics: 5328/5329

3. OBJECTIVE. The chapter provides guidance for evaluating an operator/applicant's weight and balance control program/procedures.

5. GENERAL.

A. Approved weight and balance control procedures are the only means for an operator/applicant to authorize the use of other than known weights for crew, passengers, baggage, or cargo. The weight and balance control program, including loading schedules and charts, are approved on operations specifications (OpSpecs) by the Principal Maintenance Inspector (PMI). This program must be included in the operator/applicant's policies and procedures manual.

B. The operator/applicant may develop and submit for approval any method or procedure by which they can show that an aircraft:

- Is properly loaded according to approved configuration (loading schedules or charts)
- Will not exceed authorized weight and balance limitations during all ground and flight operations
- Will be periodically reweighed and its data re-evaluated
- Will have its data recalculated, if changes necessitate

C. The operator/applicant's weight and balance control procedures may either be an independently controlled document which includes all the instructions and procedures for maintenance, operations, and baggage/cargo control, or it may be included in the manual.

7. ESTABLISHED WEIGHT AND CENTER OF GRAVITY (CG) LIMITS.

A. During type certification, the aircraft manufacturer must flight test weight and balance under all conditions and establish center of gravity limits. These limits are approved by the Federal Aviation Administration (FAA).

B. If an operator/applicant proposes an unusual or complex weight and balance program, or a program substantially different from the Approved Aircraft Flight Manual or Pilot Operating Handbook, regional assistance should be requested.

9. LOADING PROCEDURES.

A. Use of Average Passenger Weights. For aircraft operated under Title 14 of the Code of Federal Regulations (14 CFR) parts 121 and 135, average passenger and baggage weights may be authorized.

(1) Average weights may be determined by actually weighing passengers and baggage and documenting the weights. Average weights must be based on acceptable data collected during actual operations.

(2) Generally, average weights for operations in warm climates are lighter than those in colder climates. In establishing average passenger and baggage weights, operating environment must be considered. For example, clothing worn or carried in colder climates may affect the established weight.

NOTE: The average passenger and baggage weights in Advisory Circular (AC) 120-27, Aircraft Weight and Balance Control, as amended, do not comprise a regulatory requirement or authorization. This information is guidance only and must be evaluated for applicability to individual operators.

B. Nonstandard Weight Groups. Average weights are not suitable for groups that tend to be heavier or lighter than the average. The operator/applicant must use actual weights for loading nonstandard weight groups and their baggage (such as athletic squads, military personnel, and children's groups).

C. Nonstandard Passenger Weight.

(1) *Actual Passenger Weights.* Actual passenger weights are used for nonstandard weight groups, unless average weights have been established for those groups. This includes athletic squads and other groups which are larger or smaller than the U.S. average. When such groups form only a part of the total passenger load, actual weights or established average weights for the nonstandard group may be used for such exception groups, and average weights

used for the balance of the passenger load. In such instances, a notation should be made in the load manifest indicating the number of persons in the special group and identifying the group; i.e., a football squad.

(2) *Determination of Actual Passenger Weight.* Actual passenger weights may be determined by:

(a) Scale weighing of each passenger prior to boarding the aircraft, including handbags carried on board by the passenger; or

(b) Asking each passenger his/her weight and adding to it a predetermined constant to provide for handbags and clothing. This constant may be approved for an operator on the basis of studies performed by the operator that consider particular routes and seasonal variations, when applicable. Personnel listing passengers on this basis should receive instructions for estimating passenger weights to reasonably confirm their accuracy.

(3) *Nonstandard Average Passenger Weights: Military Groups.* In lieu of actual weights (preferred), the following average weights may be used for military groups, unless the passengers or their carry-on baggage appreciably differ from these standard weights:

Noncombat-Equipped Military Personnel.....195 pounds

NOTE: This weight includes 20 pounds of hand-carried baggage.

Combat-Equipped Military Personnel..... 225 pounds

NOTE: This represents the standard combat soldier as would be seen on contract flights involving large movements. This includes 195 pounds as shown above, 20 pounds for an additional hand-carried mobility pack, and an additional 10 pounds for hand-carried weapons.

D. *Carry-on Baggage.* Procedures must be provided for controlling carry-on baggage.

(1) Carry-on baggage must be limited to articles that may be placed in an overhead compartment or under seats. No article may be placed in an overhead compartment that causes the weight limit of the compartment to be exceeded.

(2) Carry-on baggage weight must either be accounted for in the same manner as checked baggage or be added to the passenger weight.

(3) Operators using average weights for computing weight and balance should re-evaluate carry-on baggage weight at least once per year.

11. CARRY-ON BAGGAGE. PMI's for operators of aircraft with limited carry-on baggage storage can use the following guidance and chart to facilitate a program that allows their operators to develop a program that will meet their needs.

A. The operator of aircraft with limited carry-on baggage storage develops for approval by the FAA a program that identifies how the operator would accurately identify what is carry-on baggage and what is checked baggage. This program would clearly explain how the operator would handle passengers that have two pieces of carry-on baggage for a total of 20 pounds.

B. Request further guidance or assistance from their regional Flight Standards Divisions when reviewing/approving weight and balance programs where necessary.

C. Average Passenger Weights -- Aircraft With Limited Cabin Stowage (no carry-on baggage).

Summer - for the period of May 1 through October 31:

Adult Passenger
(60%/40% male/female mix).....160 pounds
Male.....175 pounds
Female.....135 pounds

Winter - for the period of November 1 through April 30:

Adult Passenger
(60%/40% male/female mix).....165 pounds
Male.....180 pounds
Female.....140 pounds

Summer/Winter

Children.....80 pounds
(Applicable between ages 2 and 12)

(1) If the operator allows for one carry-on bag, the above weights must be increased by 10 pounds (the 80-pound weight for children is not affected).

(2) If the operator allows for no carry-on baggage, the operator's program could allow for two pieces of baggage being identified as carry-on baggage that would be stored in the baggage compartment and accounted for a total of 20 pounds per adult passenger. If one of these two bags is allowed in the cabin and the other stored in the baggage compartment, then these two bags only will be accounted for a total of 20 pounds.

13. AIRCRAFT WEIGHTS.

A. *Weighing of Aircraft.*

(1) Aircraft operated under part 135 are required to be weighed at least once every 36-calendar months. Both

the operator/applicant's OpSpecs and manual must reflect this requirement.

(2) Aircraft operated under part 121 are required to be weighed at intervals approved by the PMI.

B. Use of Fleet Weights. A fleet generally is considered to be three or more aircraft of the same model and configuration. This allows realistic averages to be determined.

(1) Aircraft operating under fleet weights must be weighed in accordance with the operator/applicant's instructions. The operating weights and CG position must be within established limits. The use of fleet weights is authorized by OpSpecs.

(2) An operator's empty fleet weight is determined by averaging aircraft weights as follows:

FLEET SIZE

WEIGHING POLICY

3 aircraft

Weigh all aircraft

4 to 9 aircraft

Weigh 3 aircraft plus at least 50 percent of the number over 3

Over 9 aircraft

Weigh 6 aircraft plus at least 10 percent of the number over 9

C. Scales used to weigh passengers, aircraft, cargo, and baggage must be calibrated and traceable to a national standard. Calibration must be performed in accordance with the civil authority for weights and measures having jurisdiction over the area in which the scales are used. The frequency of testing depends on use and handling.

15. CONTRACTORS.

An operator/applicant may use a contractor to weigh items required to be weighed. However, the operator/applicant is responsible for ensuring the contractor complies with the operator/applicant's approved weight and balance control program. This includes ensuring scales are calibrated and tested in accordance with the operator/applicant's policies and procedures manual.

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SECTION 2. PROCEDURES

1. PREREQUISITES AND COORDINATION REQUIREMENTS.

A. Prerequisites:

- Knowledge of the regulatory requirements of parts 121 and 135
- Successful completion of Airworthiness Inspector's Indoctrination Course for General Aviation and Air Carrier Inspections, or previous equivalent
- Previous experience with parts 121, 125, or 135 weight and balance programs

B. Coordination. This task requires close coordination between maintenance and operation inspectors.

3. REFERENCES, FORMS, AND JOB AIDS.

A. References:

- Parts 21, 43, and 91
- AC 91-23, Pilot's Weight and Balance Handbook, as amended
- AC 120-27, Aircraft Weight and Balance Control, as amended
- Approved Flight Manuals
- Approved Weight and Balance Manuals
- Type Certificate Data Sheets and Aircraft Specifications
- Supplemental Type Certificates
- Aircraft Equipment Lists
- Aircraft Maintenance Records (Weight and Balance Records)

B. Forms:

- FAA Form 8400-7, Operations Specifications

C. Job Aids:

- Automated operations specifications checklists and worksheets

5. PROCEDURES.

A. Coordinate with the Operator/Applicant. The operator/applicant must submit the following for review:

- Manual or revision
- Weight and Balance Program document (if not part of a manual)
- Pertinent company procedures
- Instructions for completing forms used in aircraft weight control and aircraft loading
- Mathematical justification for loading provisions or schedules

B. Review the Operator/Applicant's Manual/Program Document. The manual must include procedures, levels of authority, and information appropriate to part 121 or 135. In addition, the following must be included:

(1) Manual introduction, to include:

- Description of the philosophy and the goals of the manual
- Description of the division of contents between volumes, if more than one volume
- List of effective pages, including dates

(2) Manual revision and distribution procedures, to ensure:

- Current information is provided to all manual holders
- Manuals are available to maintenance, operations, and ground personnel and are furnished to the Certificate-Holding District Office (CHDO)

(3) Definitions of all significant terms used in the program. The definitions must reflect their intended use and include any acronyms or abbreviations unique to the manual.

(4) Description of the organizational unit responsible for the control and maintenance of the weight and balance program, to include:

- Definitions of lines of authority
- Description of the support structure

(5) Job descriptions for all elements.

(6) Training programs that include the following:

- Maintenance personnel
- Operations and dispatch personnel
- Ground handling personnel

(7) A means of documenting and retaining individual training records.

(8) Procedures for:

- Determining standards and schedules for calibration of aircraft scales
- Pre-weighing instructions and requirements
- Determining which aircraft are to be weighed
- Establishing and maintaining equipment lists for each aircraft
- Recording the type and serial number for each scale used, airplane weight, residual fluids, and scale tare weights
- Initial weighing of aircraft

- Monitoring and adjusting individual aircraft or fleet, empty weight, and CG
- Periodic reweighing of aircraft
- Ensuring aircraft are configured in accordance with approved data

(9) A loading schedule consisting of graphs/tables or a special loading schedule for a calculator or computerized program. These schedules must ensure that pertinent data is available concerning all probable weight and balance conditions of the aircraft.

(10) A load manifest on which all required loading information shall be entered by personnel responsible for weight and balance control, including procedures for:

- Completing the load manifest
- Ensuring load manifest is carried on the aircraft
- Retaining the load manifest for the time periods specified in the CFR's
- Distribution of the load manifest in accordance with §§ 121.695 and/or 121.697 (as applicable), and 135.63(c)

(11) Procedures to be used by crewmembers, cargo handlers, and other personnel concerned with aircraft loading, for the following:

- Distribution of passengers
- Distribution of fuel
- Distribution of cargo
- Verification and acceptance of actual cargo weights as listed on a bill of lading
- Restriction of passenger movement during flight, if applicable
- Hazardous material requirements, if applicable

(12) A drawing of each cargo and/or passenger configuration to include emergency equipment locations.

(13) Mathematical justification for loading provisions or schedules. This may be included under separate cover and not as part of the company manual.

(14) An alternate procedure for allowing manual computations, if a computerized weight and balance program is utilized.

(15) Procedures for a weight range system, if applicable, that ensures:

(a) The range is typical of passengers carried on similar operations.

(b) Computations for critical load considerations support the ranges.

(c) Personnel responsible for loading the aircraft are required to prepare appropriate loading records.

(d) The system includes methods for loading passengers whose weights are outside the range.

(e) Loading records indicate the number of passengers within the stated range and account for passengers that do not fall within the range.

(16) A system for loading nonstandard weight groups, such as athletic squads or military groups and their baggage, which must utilize actual weights for both passengers and baggage.

(17) Procedures to verify actual weight of cargo.

(18) Standards and schedules for calibration of commercial scales used to determine baggage/cargo weights.

(19) Procedures to ensure that carry-on baggage is limited to articles which may be placed in overhead compartments or under seats. Carry-on baggage weight must be accounted for in the same manner as checked baggage or added to the average passenger weight.

C. Review the Operator/Applicant's Operations Specifications. Review the draft OpSpecs to ensure that operations specifications paragraph E includes the following:

(1) Aircraft make/model/series.

(2) Type of loading schedule.

(3) Loading schedule instructions for:

- Passengers and crew (average or actual weight)
- Baggage (average or actual weight) and cargo (actual)
- Nonstandard weight groups

(4) Weight and balance control procedures.

NOTE: The above items must be referenced by indicating the locations in the operator/applicant's manuals; e.g., volume, chapter.

D. Analyze the Results. Upon completion of review, analyze the results and determine whether the operator/applicant's manual and operations specifications meet all requirements.

E. Meet With Operator/Applicant. Discuss any discrepancies with the operator/applicant and advise what areas need corrective action.

7. TASK OUTCOMES.

A. File PTRS Data Sheet.

B. Approve OpSpecs in accordance with Vol. 2, Ch. 84, FAR Part 121/135 Operations Specifications.

C. Document the Task. File all supporting paperwork in the operator/applicant's office file.

9. FUTURE ACTIVITIES. Normal surveillance.